IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

MEARS TECHNOLOGIES, INC.,	§	
	§	Civil Action No. 2:14-cv-938-JRG
Plaintiff,	§	LEAD CONSOLIDATED CASE
	§	
v.	§	
	§	
AT&T CORP., et al.,	§	
	§	
Defendants.	§	
	§	
VERIZON SERVICES CORP.,	§	2:14-cv-937-JRG

DEFENDANT AND COUNTERCLAIM PLAINTIFF VERIZON SERVICES CORP.'S
RESPONSIVE CLAIM CONSTRUCTION BRIEF

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I. INTRODUCTION AND BACKGROUND

Verizon Service's Corp. ("Verizon") owns and operates telecommunications networks over which it provides a variety of telecommunications services to its customers. Some of Verizon's networks are optical networks that use light to transmit communications traffic across fiber-optic cables. In order to selectively route traffic on a fiber-optic line to different destinations, Verizon's optical networks include reconfigurable optical add-drop multiplexers ("ROADMs"). One of the components of a ROADM is a device called a wavelength selective switch ("WSS"). Verizon does not manufacture ROADMs or WSSs; instead, Verizon purchases ROADMs from various vendors, who in turn acquire WSSs from other suppliers such as Finisar, JDSU, and Nistica. Different types of WSSs are available in the marketplace − for example, some WSSs use mirrors to direct light in different directions, while others accomplish that function using liquid-crystal-on-silicon or "LCoS" technology. When purchasing ROADMs, Verizon does not specify the type of WSS that should be included, nor does it specify the supplier or manufacturer from whom the WSS should be sourced.

On October 8, 2014, Mears Technologies, Inc. ("Mears") sued Verizon for infringement of U.S. Patent No. 6,141,361 ("the '361 patent"), titled "Wavelength Selective Filter" (Dkt. No. 49-1). Mears's Corrected First Amended Complaint asserts that Verizon infringes the '361 patent because Verizon has allegedly "deployed in its telecommunications networks liquid crystal on silicon ('LCoS') based [ROADMs], wherein the wavelength selective switches contained in such ROADMs are manufactured by Nistica, Inc., and/or JDSU." (Dkt. No. 46, ¶ 8). Mears did not identify any particular ROADM or class of ROADMs that contains LCoS-based WSSs manufactured by Nistica or JDSU. Verizon has not identified any such WSSs in any of the ROADMs deployed in its networks.

This is not Mears's first attempt to assert the '361 patent in this Court. Mears previously sued Finisar Corporation ("Finisar") – a manufacturer of WSSs – in *Mears Technologies, Inc. v. Finisar Corp.*, No. 2:13-cv-376 (E.D. Tex.). On December 30, 2014, the Court granted summary judgment of noninfringement to Finisar (*see* Dkt. No. 126) for WSS technology that, to Verizon's knowledge, is identical to the WSS technology at issue in this case in all respects relevant to the '361 patent.

A. The '361 Patent

The '361 patent discloses "[a] tunable optical wavelength selective filter." '361 patent [57] (abstract). Claim 1 of the patent, asserted by Mears in this case, recites:

> 1. A tunable filter for polychromatic optical radiation comprising an electronically programmable spatial light modulator for displaying computer generated hologram patterns of data as a series combination of a first dynamically variable wavelength dispersive element, and a second static wavelength dispersive element.

Although claim 1 uses technical terminology to describe the components that make up the claimed filter, the structure described in the claim is relatively straightforward once the constituent components are identified.

"Polychromatic optical radiation" refers to light that is composed of multiple colors (i.e., multiple wavelengths). Correspondingly, a wavelength dispersive element is "a device that separates waves of different wavelengths [of light] to different spatial positions." Memorandum Opinion and Order at 13, *Finisar*, No. 2:13-cv-376 (E.D. Tex. June 17, 2014), Dkt. No. 74 ("*Finisar* Claim Construction Order").[1] Therefore, the device described in claim 1 is a spatial light modulator that includes two optical components in series (i.e., one after the other): (1) "a first dynamically variable wavelength dispersive element" and (2) "a second static wavelength

[1] Attached here as Exhibit A. All exhibits to this brief are attached to the Declaration of J.C. Rozendaal.

dispersive element." '361 patent claim 1; *Finisar* Claim Construction Order at 24 (construing claim 1 as requiring the first and second wavelength dispersive elements to be "in" the spatial light modulator).

The spatial light modulator described by claim 1 "display[s] computer generated hologram patterns of data." '361 patent claim 1. In the context of the '361 patent, a "hologram" is "an optical device configured as a grating or a diffraction element." *Finisar* Claim Construction Order at 29. Therefore, the claimed spatial light modulator is a device that impacts incoming light as a grating or diffraction element would, for example, by "dispers[ing] light of different wavelength into its constituent spectral components." '361 patent at 1:53-56. Put simply, the spatial light modulator of claim 1 is a device that functions like a grating or diffraction element and contains a "first dynamically variable wavelength dispersive element" and a "second static wavelength dispersive element" arranged one after the other.

In addition to claim 1, Mears has asserted claims 10, 13, and 16 against Verizon. Each of those claims depends from claim 1. Claim 10 adds that the dynamically variable wavelength dispersive element "comprises an array of N sub-holograms." Claim 13 adds that the "one or both" of the wavelength dispersive elements described by claim 1 are reflective. Claim 16 recites "a memory storing data for at least one computer generated hologram[,] which when displayed in use, causes multiplexing of wavelengths [i.e., colors of light] in a predetermined manner."

B. The *Finisar* Litigation

In *Finisar*, the Court construed a number of the '361 patent's claim terms and phrases that were disputed by the parties in that case. Of particular relevance to the current dispute between Verizon and Mears, the Court construed the claim phrase "spatial light modulator for

displaying computer generated hologram patterns of data as a series combination of a first dynamically variable wavelength dispersive element, and a second static wavelength dispersive element" to mean that the "series combination of a first dynamically variable wavelength dispersive element and a second static wavelength dispersive element is ***in*** the spatial light modulator." *Finisar* Claim Construction Order at 24 (emphasis added). The Court thereby rejected Mears's argument that the "spatial light modulator" was itself the "first dynamically variable wavelength dispersive element" and that the "second static wavelength dispersive element" was separate from and in series with the "spatial light modulator." *See id* at 21, 24.

Given the Court's construction, Mears admitted that it could not show that Finisar's WSSs infringed the '361 patent under the theory set forth in its infringement contentions. Mears sought leave to amend its infringement contentions, but the Court denied that request as untimely and because Mears's amended contentions represented a "substantial change to [its] infringement theory." *See* Order at 3-4, *Finisar*, No. 2:13-cv-376 (E.D. Tex. Oct. 6, 2014), Dkt. No. 121. The Court subsequently granted Finisar's motion for summary judgment of noninfringement. *See Finisar*, No. 2:13-cv-376 (E.D. Tex. Dec. 30, 2014), ECF No. 126.

C. The Accused Products and Services[2]

Because Verizon has been unable to identify any of the accused JDSU or Nistica LCoS-based WSSs deployed in its telecommunications networks, Verizon's knowledge of the accused devices is limited to what little information can be gleaned from Mears's infringement contentions, which consists mostly of citations to generic white papers addressing WSSs or related technology.

[2] [K]nowledge of th[e accused] product or process provides meaningful context for the first step of the infringement analysis, claim construction." *Wilson Sporting Goods Co. v. Hillerich & Bradsby Co.*, 442 F.3d 1322, 1326-27 (Fed. Cir. 2006).

With respect to the accused JDSU WSSs, Mears's infringement contentions provide the following generic figure, which comes from a JDSU white paper titled "A Performance Comparison of WSS Switch Engine Technologies":

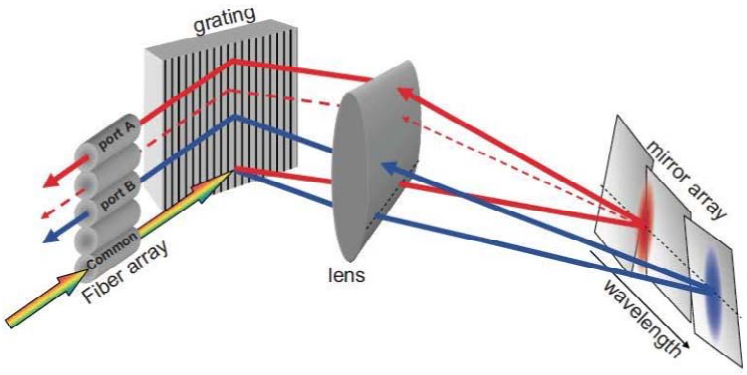


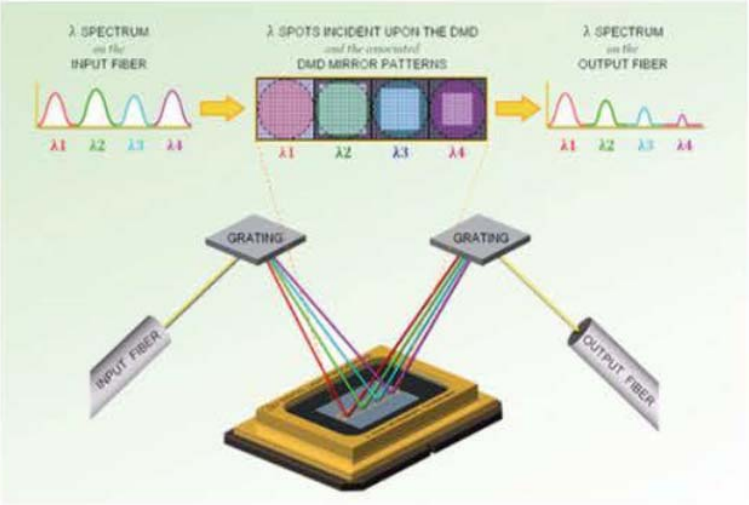
Figure 3-3: Illustration of how decreased port isolation towards the edges of the channel band is caused by the beam overlapping adjacent actuator regions (shown here as mirrors for simplicity). For those wavelengths where the beam overlaps two actuator regions (red beam), the beam is split and light is directed towards two output ports, one being the intended port (solid red line) and the other being an unintended port (dashed red line).

Mears's Preliminary Infringement Contentions, Ex. A at 13 (Ex. B). The figure shows input polychromatic (i.e., multi-color) lights from the "common" fiber-optic cable on a fiber array (shown as the bottom fiber in the stack on the left side of the diagram). That input light strikes a grating that breaks it up into constituent wavelengths (i.e., colors). Mears identifies this grating as the "second static wavelength dispersive element" in the claims. *Id.* at 14-15. The dispersed light then passes through a lens to a "mirror array" that reflects different wavelengths of light in different directions. Mears identifies the mirror array as the "first dynamically variable wavelength dispersive element" in the claims. *Id.* at 13, 15. Because the mirror array reflects different wavelengths independently, one color of light is ultimately directed to the optical fiber labeled as "port A" in the fiber array, while another color is directed to a different fiber labeled as "port B." Mears's infringement contentions allege that the non-LCoS mirror array is merely

exemplary, and that in the accused LCoS-based WSSs the mirror array is replaced by an "LCoS optical element." *Id*. at 13.

Mears's infringement contentions for Nistica WSSs accuse a similar structure. Mears relies on the following figure from Texas Instrument's website because Nistica WSSs allegedly use Texas Instrument Digital Light Processing ("DLP") technology:

Switch to DLP for your telecom solution!



Mears's Preliminary Infringement Contentions, Ex. B at 6 (Ex. C). Again, the figure shows light from an input optical fiber that is first dispersed into its constituent wavelengths by a static grating. The dispersed light is then reflected by a Digital Micromirror Device ("DMD") that independently modifies the dispersed wavelength components. The modified wavelength components are then recombined by another grating prior to entering the output fiber-optic line.

II. LEGAL AUTHORITY

Claim language is given the meaning it would have to one of ordinary skill in the relevant art, at the time the application was filed, in view of the patent specification. *Phillips v. AWH Corp*., 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc). "The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will

be, in the end, the correct construction." *Id*. at 1316 (quoting *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)).

Whenever the parties have a significant dispute over the scope of a claim, the court must resolve it and may not leave it for the trier of fact to resolve. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 390-91 (1996). "A determination that a claim term 'needs no construction' or has the 'plain and ordinary meaning' may be inadequate when a term has more than one 'ordinary' meaning or when reliance on a term's 'ordinary' meaning does not resolve the parties' dispute." *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008). Even commonly used words may need construction. *Renishaw*, 158 F.3d at 1243 (construing "when").

"Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent" and "whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Phillips*, 415 F.3d at 1317. A court "cannot construe the claims to cover subject matter broader than that which the patentee itself regarded as comprising its inventions and represented to the PTO." *Microsoft Corp. v. Multi-Tech Sys., Inc*., 357 F.3d 1340, 1349 (Fed. Cir. 2004). Arguments and amendments made during prosecution "to overcome prior art can lead to narrow claim interpretations because '[t]he public has a right to rely on such definitive statements.'" *Rheox, Inc. v. Entact, Inc.*, 276 F.3d 1319, 1325 (Fed. Cir. 2002) (quoting *Digital Biometrics, Inc. v. Identix, Inc.*, 149 F.3d 1335, 1347 (Fed. Cir. 1998)). "The prosecution history constitutes a public record of the patentee's representations concerning the scope and the meaning of the claims, and competitors are entitled to rely on those representations when ascertaining the degree

of lawful conduct." *Springs Window Fashions LP v. Novo Indus., L.P.*, 323 F.3d 989, 995 (Fed. Cir. 2003) (internal quotation marks omitted).

A patent's claims need not encompass all embodiments disclosed in the specification. *TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1373 (Fed. Cir. 2008). It is frequently the case that subject matter is disclosed by a patent's specification but not claimed. *Id.* ("Our precedent is replete with examples of subject matter that is included in the specification, but is not claimed."). Such unclaimed subject matter is dedicated to the public. *Schoenhaus v. Genesco, Inc.*, 440 F.3d 1354, 1359 (Fed. Cir. 2006); *Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1562-63 (Fed. Cir. 1991). Therefore, the mere existence of an alternative embodiment in a patent specification does not outweigh the language of a claim properly construed in light of the intrinsic evidence. *See TIP Sys.*, 529 F.3d at 1373.

Similarly, a claim may be construed to exclude an embodiment disclosed in the specification "if the prosecution history compels such a result." *N. Am. Container, Inc. v. Plastipak Packaging, Inc.*, 415 F.3d 1335, 1346 (Fed. Cir. 2005). When multiple embodiments are disclosed in a specification, the Federal Circuit has "interpreted claims to exclude embodiments where those embodiments are inconsistent with unambiguous language in the patent's specification or prosecution history." *Sinorgchem Co., Shandong v. ITC*, 511 F.3d 1132, 1138 (Fed. Cir. 2007).

Though less significant than intrinsic evidence, extrinsic evidence such as dictionaries (especially technical dictionaries), technical treatises and articles, and prior art "can help the court determine what a person of ordinary skill in the art would understand claims terms to mean." *Phillips*, 415 F.3d at 1317-19; *see also Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1584 (Fed. Cir. 1996). Additionally, extrinsic evidence in the form of "expert testimony

can be useful to a court for a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field." *Phillips*, 415 F.3d at 1318. *See also Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 837-38 (2015) (explaining how "extrinsic evidence may help to establish a usage of trade or locality") (internal quotation marks omitted).

III. CONSTRUCTION OF DISPUTED CLAIM TERMS

A. "Spatial Light Modulator"

1. Background

Term or Phrase	Claims	Verizon's Construction	Mears's Construction
"spatial light modulator"	1	"an integrated unit on which appears computer-generated hologram patterns of data"	"an electronically programmable device that can modulate input light by controlling its amplitude only, phase only, or both, based on a specific spatial pattern displayed on the device"

Verizon's construction of the term "spatial light modulator" is consistent with the Court's previous *Finisar* constructions.

In *Finisar*, the Court rejected Mears's argument that the claimed "spatial light modulator" is the "first dynamically variable wavelength dispersive element" ("the dynamic element") and that the "second static wavelength dispersive element" ("the static element") is not part of the "spatial light modulator." The Court instead construed claim 1 as requiring that the dynamic element and the static element be ***in*** the spatial light modulator. Mears's solution to that problem in this case is to draw a box around any set of spatially separate, non-integrated

components that include a dynamic element and a static element and call that box a "spatial light modulator." Mears's approach, however, renders the Court's *Finisar* construction a nullity and ignores the reasoning underlying that construction. Additionally, Mears's infringement theory ignores that a "spatial light modulator" is well known to persons in the art as a discrete unit that is integrated into a single package. *See* Ralph Decl. ¶¶ 17-24.[3] It is not an abstraction defined by any grouping of a dynamic wavelength dispersive element and a static wavelength dispersive element separated in space. Verizon therefore seeks a construction of "spatial light modulator" that affirms and clarifies the Court's *Finisar* construction so as to foreclose Mears from sidestepping the clear import of that construction. Specifically, Verizon seeks a construction requiring that the dynamic and static elements be physically combined as a single unit. As explained below, limiting claim 1 to that embodiment is the only way to make sense of otherwise conflicting intrinsic evidence.

2. The Court's Previous Analysis of the term "Spatial Light Modulator"

This Court in *Finisar* construed the claim phrase "spatial light modulator for displaying computer generated hologram patterns of data as a series combination of a first dynamically variable wavelength dispersive element, and a second static wavelength dispersive element" to mean that *both* the dynamic and static elements are *in* the "spatial light modulator." The Court first noted that a "spatial light modulator" is "structure," thereby indicating that the term does not refer to an abstraction. *Finisar* Claim Construction Order at 22. The Court then relied on an amendment to claim 1 made during prosecution of the '361 patent to overcome the examiner's rejection for indefiniteness. *Id*. Prior to the amendment, claim 1 recited:

> 1. A tunable optical wavelength selective filter comprising an electronically programmable spatial light modulator for displaying

[3] Expert Declaration of Stephen E. Ralph (July 6, 2015) is being filed in support of this brief.

> computer generated hologram patterns of data as a first wavelength dispersive element, in combination with a second fixed wavelength dispersive element.

Int'l Prelim. Examination Report, Int'l App. No. PCT/GB95/02325, at MEARS0000082 (Amended Claims Sheet) (Jan. 1994) (Ex. D-2). The examiner rejected that claim because it "fail[ed] to set forth the structure of the electronically programmable spatial light modulator." Office Action, App. No. 08/817,876, at MEARS0000101 (June 20, 1999) (Ex. D-3). The claim subsequently was amended to its current form. The applicants explained that "[t]he amendment to claim 1 recites a series combination of the two wavelength dispersive elements in the spatial light modulator." Amendment Under 37 C.F.R. § 1.111, at MEARS0000115 (July 24, 1997) (Ex. D-4).

The amended claim language and the applicant's "explanation of such language, ma[de] clear that both dispersive elements are 'in the spatial light modulator.'" *Finisar* Claim Construction Order at 23. The Court's construction in *Finisar* thus resolved the issue of whether the "static wavelength dispersive element" was in or out of the claimed "spatial light modulator." Mears's infringement theory in the present case, however, renders the limitation imposed by the Court's *Finisar* construction no limitation at all. Mears's infringement contentions show that it believes that it can put a box (imaginary or real) arbitrarily around separate static and dynamic elements and then say the box is a spatial light modulator – a technique that would allow Mears to take a static dispersive element that is outside the spatial light modulator and make it part of the spatial light modulator simply by extending an arbitrary box.

Under that theory the spatial light modulator is not an integrated device that can display a hologram but is any set of physically separated components that individually display holograms. Mears's theory thus cannot be squared with the logic underlying this Court's *Finisar* claim constructions. In contrast, Verizon's proposed construction of "spatial light modulator" as a

single, physically integrated unit is consistent with, and indeed implicit in, the Court's *Finisar* constructions.

3. Intrinsic Evidence

Verizon's construction is also consistent with the claims, specification, and prosecution history, all of which show that the '361 patent requires the physical combination of the "first dynamically variable wavelength dispersive element" and the "second static wavelength dispersive element" into an integrated "spatial light modulator" that "displays computer-generated hologram patterns of data."

The specification explicitly discloses an embodiment in which the static and dynamic elements are physically combined:

> The fixed grating may simply have the form of a fixed regular amplitude grating or phase plate. When the fixed grating has the form of a phase plate it may be an etched glass plate and *may be physically combined with the dynamic holographic diffraction element* by, for example, being etched into its outer surface.

'361 patent at 2:19-24 (emphasis added); *see also id*. at 7:9-11 ("The size of the system could be reduced further by etching the fixed grating or hologram directly onto a glass face of the SLM dynamic hologram device."). By amending claim 1 as described above to require that the spatial light modulator include not only the dynamic element but also the static element, the applicants limited the scope of their claim to this type of embodiment, which has both elements in a single physical unit. The specification consistently treats the spatial light modulator as a single physical device rather than an abstract grouping of wavelength dispersive elements. For example, the specification states:

> The dynamic diffraction element is preferably implemented as an electronically controlled image displayed on a pixellated spatial light modulator and in particular a spatial light modulator using opto-electronic integrated circuits fabricated using silicon VLSI technology and integrated with ferro-electric, nematic or

> electroclinic liquid crystals. Such spatial light modulators are well suited to telecommunication applications in terms of speed, reliability and ease of interfacing to control electronics. Such devices are readily controllable, typically via a computer to display one of a series of different holographic diffraction patterns. Typically such holograms are 2-dimensional optical phase and/or amplitude gratings which produce a controllable deviation and dispersion of the incident light . . . .

'361 patent at 1:67 – 2:14; *see also id.* at 7:43 (describing a spatial light modulator that is "a transmissive multiplexed glass cell"). Furthermore, in describing the physically combined embodiment, the specification states that "[t]he size of the system could be reduced further by etching the fixed grating or hologram directly onto a glass face of the SLM dynamic hologram device." *Id*. at 7:9-11. And although the figures in the '361 patent show the dynamic element **3** as physically separate from the static element **2**, those figures were part of the original patent application and therefore existed before the applicants disclaimed all but the physically integrated embodiment by amending claim 1 to require that the dynamic and static elements be "in" the spatial light modulator.

The claims and specification further suggests that a spatial light modulator is a physically integrated unit by frequently referring to the claimed dynamic wavelength dispersive element alone as the "spatial light modulator." *See id*. claim 14 (claiming embodiment where the "first dynamically variable wavelength dispersive element **(3)** comprises a back plane ferro-electric liquid crystal spatial light modulating device"), 4:7-9 ("The dynamic hologram **3** would probably be implemented as an electronically controlled image displayed on an amplitude- or phase-mode SLM."), 5:23-26 (describing an embodiment that "us[es] a transmissive SLM as the dynamic hologram"), 7:10-11 (referring to the "the SLM dynamic hologram device."), 7:22-31 (describing an embodiment where the beam is first "passed through the SLM **3** and diffracted by the displayed binary phase hologram" and then "further diffracted and angularly dispersed by a

fixed . . . grating"). There is no inconsistency, however, between calling the dynamic element the "spatial light modulator" and the requirement that the dynamic element and the static element be "in" the "spatial light modulator" provided that the static element is physically integrated with the spatial light modulator (for example, by being etched onto its surface, *see id.* at 2:19-24, 7:9-11). *See* Ralph Decl. ¶ 24. Verizon's construction is the only one that makes sense of the amendment to claim 1 described above (and relied on by the Court in *Finisar*) and of the specification's consistent reference to the dynamic element as the "spatial light modulator."

4. Extrinsic Evidence

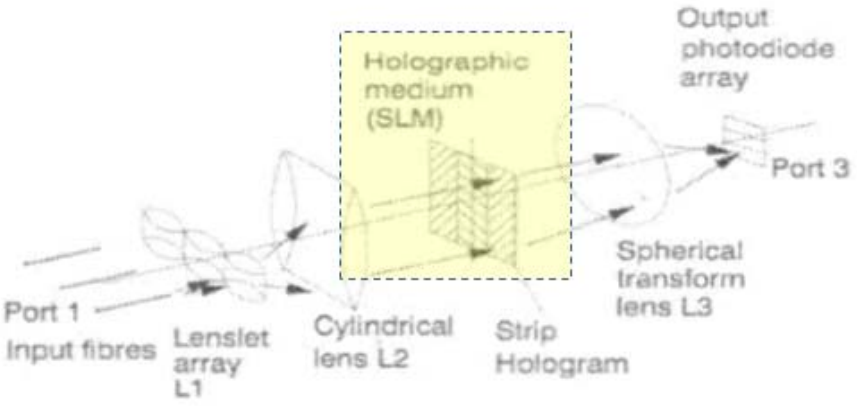
As Verizon set forth in the Joint Claim Construction and Prehearing Statement, a substantial number of technical publications (both prior-art and otherwise) from the field of optical electronics show that a "spatial light modulator" is a discrete optical component, not an abstraction used to describe a combination of physically separated components. *See* Joint Claim Construction and Prehearing Statement, Ex. B (Dkt. No. 44-2) (Ex. E).[4] Those technical publications show not only that a "spatial light modulator" is a well-known physical unit, but also that it is a discrete component that is integrated into a single package. For example, one article describes a "novel silicon-photoconductor-based liquid-crystal light valve, or spatial light modulator" where "[t]he whole structure is assembled within an airtight anodized aluminum holder." U. Efron *et al.*, *The Silicon Liquid Crystal Light Valve*, 57 J. Appl. Phys. 1356, 1356-57 (Feb. 15, 1985) (Ex. E-27); *see also* Tsutomu Hara, *Phase Modulation with Microchannel Spatial Light Modulator (MSLM)*, 74(8) Elecs. & Commc'ns in Japan 40, 41 (1991) ("The cross-section of the MSLM is shown in Fig. 1. It is an electron tube. . . .") (Ex. E-30); *Spatial Light*

[4] For the Court's convenience, in addition to the excerpts from the publications that Verizon quotes in this brief, Verizon is also providing excerpts from the complete set of those publications cited in Dkt. No. 44-2 (Exs. E1-E38).

Modulator Technology 268-69 (Uzi Efron ed., 1995) (describing a spatial light modulator that can be constructed monolithically with the same substrate or by bonding two components together) (Ex. E-33); *id*. at 339-40 (describing the fabrication of a spatial light modulator that is "mounted in a standard integrated circuit package").

Additionally, technical publications, including technical dictionaries, consistently refer to a "spatial light modulator" as a "device," not as a series of spatially separated devices. *E.g.*, *Comprehensive Dictionary of Electrical Engineering* 596 (Philip Laplante ed., 1999) ("a device for modulating amplitude or phase of light passing through it") (Ex. E-35); Steven M. Kaplan, *Wiley Electrical and Electronics Engineering Dictionary* 732 (2004) ("An object, device, or transducer which serves to modulate a laser beam . . . .") (Ex. E-36); 2 *Encylopedia of Optical Engineering* 1895 (Ronald G. Driggers ed., 2003) ("Spatial light modulators (SLM) are devices capable of modulating the amplitude or phase of a beam of light . . . .") (Ex. E-37). Indeed, a book entitled "Spatial Light Modulator Technology," published in 1995, called two-dimensional spatial light modulators "*the building blocks* of optical information processors." *Spatial Light Modulator Technology*, *supra*, at 391 (emphasis added) (Ex. E-33). *See also* Ralph Decl. ¶ 23 (explaining that the term "device" is typically used to refer to a single component).

Verizon's extrinsic evidence also includes a variety of figures that show spatial light modulators as discrete optical components, not abstract groupings of multiple components. *See* Ex. E. The figures below are representative of figures generally found in the art:



D.C. O'Brien et al., *A holographically routed optical crossbar: theory and simulation*, 1(3) Optical Computing and Processing 233, 234 (1991) (Ex. E-19).

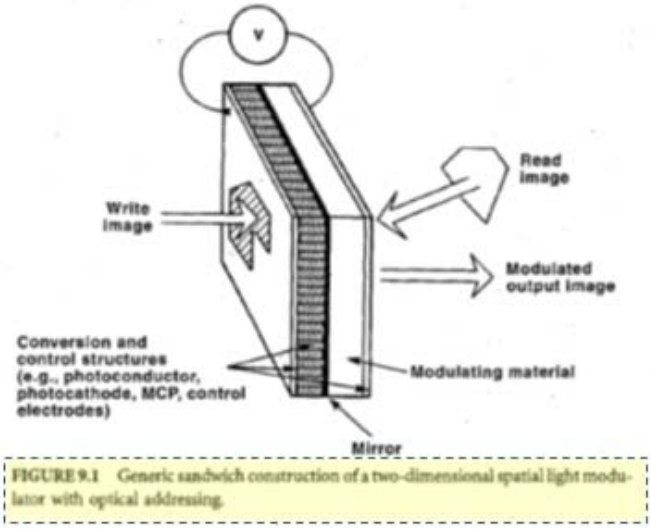
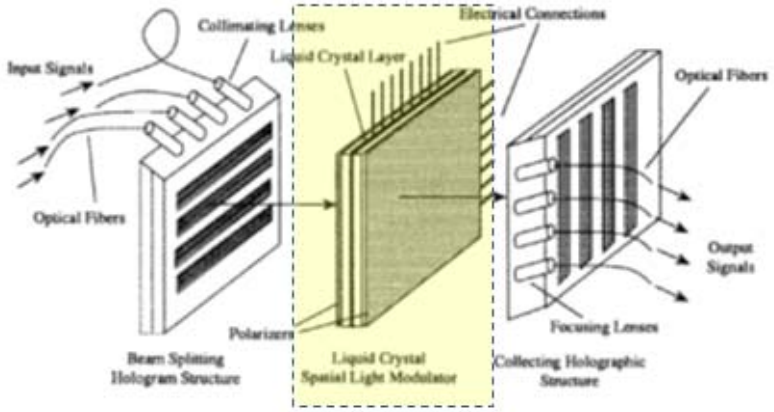


FIGURE 9.1 Generic sandwich construction of a two-dimensional spatial light modulator with optical addressing.

Handbook of Photonics 395 (Mool C. Gupta ed., 1997) (Ex. E-34).



E.M. Strzelecki et al., *Fiber optic compact crossbar switch using holographic couplers in planar geometry*, 1665 SPIE Liquid Crystal Materials, Devices, and Applications 315, 317 (1992) (Ex. E-22).

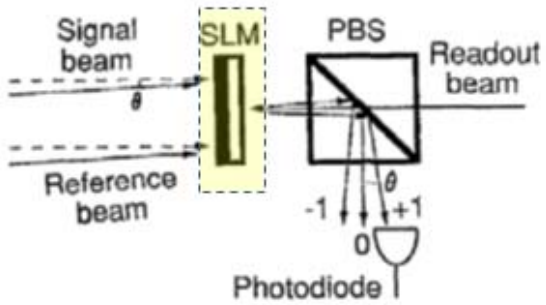


FIG. 1. Experimental setup for measuring diffraction efficiency of the spatial light modulator (SLM), polarization beam splitter (PBS).

Seiji Fukushima et al., *Real-Time Hologram Construction and Reconstruction Using a High-Resolution Spatial Light Modulator*, 58(8) Applied Physics Letters 787, 787-88 (Feb. 25, 1991) (Ex. E-31).

Indeed, even a paper authored by the inventors of the '361 patent shows the spatial light modulator of a tunable wavelength filter as a discrete, physically integrated optical component:

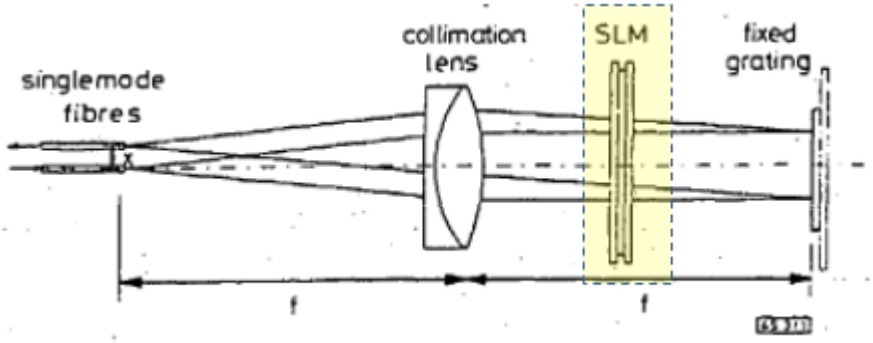


Fig. 1 *Tunable wavelength filter*

S.T. Warr, M.C. Parker & R.J. Mears, *Optically transparent digitally tunable wavelength filter*, 31(2) Electronics Letters 129 (Jan. 19, 1995) (Ex. E-25).

Verizon's expert, Dr. Stephen Ralph has also provided a declaration that a person in the field of optical electronics would understand a "spatial light modulator" to be a discrete, physically integrated optical component. *See* Ralph Decl. ¶¶ 15-24. Dr. Ralph has pointed to publications in the field that support his conclusions in that regard. *See id.*

The substantial volume of extrinsic evidence that Verizon has amassed supports the conclusion that a spatial light modulator is a discrete, physically integrated unit. Mears, on the other hand has identified no extrinsic evidence refuting Verizon's position.

5. Mears's Proposed Construction Does Not Resolve the Issue

Mears's proposed construction does not even address the question whether the static and dynamic elements recited by claim 1 must be physically combined.

Mears's proposed construction calls for "an electronically programmable device" that performs the function of a spatial light modulator. Even though the word "device" itself connotes a discrete, physically integrated unit, Mears evidently does not believe it calls for the physical integration of the dynamic and static wavelength dispersive elements recited in claim 1. Mears's proposed construction therefore does not resolve the underlying issue regarding the physical combination of those elements.

Moreover, Mears's proposed construction also adds surplusage that likely would confuse the jury. For example, Mears's construction includes the phrase "based on a specific spatial pattern displayed on the [spatial light modulator]." Claim 1, however, requires the "spatial light modulator" to display a "hologram," which the Court construed in *Finisar* (and the parties agreed here) to mean "an optical device configured as a grating or a diffraction element." *Finisar* Claim Construction Order at 29. Mears's proposed construction would therefore invite confusion over whether the "spatial light modulator" displays a "spatial pattern" or a "grating or a diffraction element."

For these reasons, Verizon asks the Court to reject Mears's proposed construction and to adopt Verizon's proposed construction of the term "spatial light modulator" as requiring that the static and dynamic elements be physically combined as a single integrated unit.

B. "First" and "Second"

1. Background

Term or Phrase	Claims	Verizon's Construction	Mears's Construction
"first" / "second"	"**first**": claims 1, 10, 13 "**second**": claims 1, 13	"**first**" – "ordered first in the series combination, such that the input optical radiation is dispersed by the first wavelength dispersive element before it is dispersed by any other wavelength dispersive element in the series combination" "**second**" – "ordered second in the series combination, such that input optical radiation is dispersed by the second wavelength dispersive element only after it is first dispersed by exactly one other wavelength dispersive element in the series combination"	"**first**" – "one of two or more" "**second**" – "another of two or more"

Verizon contends that the terms "first" and "second" describe an ordering of the "first dynamically variable wavelength dispersive element" and the "second wavelength dispersive element." Under Verizon's construction, the optical radiation input to the claimed filter interacts with the "first" element before it interacts with the "second" element. Mears's proposed construction, on the other hand, renders the terms "first" and "second' superfluous.

2. "First" and "Second" Refer to Order

The inventors of the '361 patent amended their application to clarify that the dynamic element precedes the static element, relative to the direction of light propagation in the claimed

optical filter. Original claim 1 in the international application that led to the '361 patent recited an unordered combination of the dynamic and static elements:

> 1. A tunable optical wavelength selective filter comprising a dynamic holographic diffraction element (3) in combination with a fixed diffraction grating or hologram (2).

Int'l App. Pub. No. WO 96/10762, at MEARS0000021 (claims) (Ex. D-1). Original claim 1 thus did not use the terms "first" or "second" to describe the dynamic element or the static element. During the pendency of the international application, the applicants filed an amendment[5] that added the terms "first" and "second" to claim 1:

> 1. A tunable optical wavelength selective filter comprising an electronically programmable spatial light modulator for displaying computer generated hologram patterns of data as a first wavelength dispersive element, in combination with a second fixed wavelength dispersive element.

Int'l Prelim. Exam. Report at MEARS0000082 (Ex. D-2). Although the prosecution history does not disclose the reason for the amendment, the international examiner understood "first" and "second" to refer to order. For example, the examiner noted:

> [I]t is a well-known technique in the art of spectral filtering to combine a first coarse and thus a low resolution diffractive grating with a second dispersive grating in order to enhance the wavelength resolution. An example for this technique is described in [prior-art reference] D7 which discloses a filtering comprising a first coarse diffractive grating and a second dispersive grating *disposed in the path of the beam diffracted by the first grating* . . . .

[5] Article 34 of the Patent Cooperation Treaty ("PCT") provides that "[t]he applicant shall have a right to amend the claims, the description, and the drawings, in the prescribed manner and within the prescribed time limit, before the international preliminary examination report is established." Patent Cooperation Treaty, art. 34(b). The original claims filed with the PCT application include a handwritten note "Replaced by Art. 34." Int'l Appl. Pub. No. WO 96/10762, at MEARS0000021 (Ex. D-1). The International Preliminary Examination Report includes an amended claims sheet, which was apparently the result of that article 34 amendment. The amended claims were the claims considered in the International Preliminary Examination Report. *See* Int'l Prelim. Exam. Report, at MEARS0000076-81 (Ex. D-2) (referring to aspects found only in the amended claims).

Id. at MEARS0000078 (emphasis added). The examiner thus understood that the "second" dispersive element received light already diffracted by the "first" element, and therefore that the "second" element came after the "first." Likewise, the examiner stated:

> The view expressed in the application that the amplification of a first wavelength dispersion caused by a first optical element by means of a second dispersive optical element implies an inventive step is not convincing, since this is a well-known design principle in the field of optics.

Id. The examiner thus understood that the "second" element amplifies the dispersion caused by the "first" element, and therefore necessarily comes after the "first" element. *See also id.* at MEARS0000080-81 ("An essential aspect of the present application lies in providing a second dispersive optical element to amplify a separation caused by a first dispersive optical element.").[6]

In contrast, Mears's construction renders the terms "first" and "second" mere surplusage. Patent claims, however, "are interpreted with any eye toward giving effect to all terms in the claims." *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950-51 (Fed. Cir. 2006) (describing the "principle that claim language should not be treated as meaningless"). "Allowing a patentee to argue that . . . characteristics specifically described in a claim are merely superfluous would render the scope of the patent ambiguous, leaving examiners and the public to guess about which claim language the drafter deems necessary to his claimed invention and which language is merely superfluous, nonlimiting elaboration." *Id.* at 950; *see also, e.g.*, *Digital-Vending Servs. Int'l, LLC v. Univ. of Phx., Inc.*, 672 F.3d 1270, 1275 (Fed. Cir. 2012) (construing claim

[6] Indeed, the examiner observed that although the claim made clear that the first element comes before the second in the optical path, the claim did not explicitly state the reason why the order is important – namely, to amplify angular separation. *See id* at MEARS0000081 ("Claim 1, however, leaves this aspect undefined, since it does not mention that the second dispersive element is disposed in the optical path of light beams emanating from the first dispersive element *in order to amplify the angular separation*." (emphasis added)).

language to avoid surplusage); *Elekta Instrument S.A. v. O.U.R. Scientific Int'l, Inc.*, 214 F.3d 1302, 1307 (Fed. Cir. 2000) (same).

Claim 1 recites a "series combination" of the static and dynamic elements. "Series" connotes a one-after-the-other combination of two elements in an optical circuit (or any electrical circuit). If claim 1 were intended to recite an arbitrary order of the static and dynamic elements, it could have just recited a "combination" (or "series combination") of two elements, without the adjectives "first" and "second," as in the original claim. Instead, the applicants amended claim 1 to include those words. *See also* Ralph Decl. ¶ 26.

Further, under Mears's construction the adjectives "first" and "second" are unnecessary because they do not distinguish between otherwise indistinguishable claim elements. Claim 1 recites a "dynamically variable" element and a "static" element. There is no need to further distinguish between those two elements with the modifiers "first" and "second" unless those terms refer to the order of elements – the elements are already distinguished by the terms "dynamically variable" and "static." Indeed, those terms accompany every reference to the dynamic and static elements in the dependent claims; none of the dependent claims use the adjectives "first" or "second" alone to distinguish between the dynamic and static elements. Claim 1 thus does not use the terms "first" and "second" to "distinguish between repeated instances of an element or limitation," as patent claims often do, *e.g.*, *3M Innovative Props. Co. v. Avery Dennison Corp.*, 350 F.3d 1365, 1371 (Fed. Cir. 2003), because there are no repeated instances of a claim element or limitation. Construing "first" and "second" to refer to an order thus gives meaning to terms that would otherwise have no meaning. *See also Applera Corp., MDS Inc. v. Micromass UK Ltd.*, 186 F. Supp. 2d 487, 504-08 (D. Del. 2002) (holding that "first" and "second" defined the positions of elements with respect to the path of ion travel in a

mass spectrometer); Ralph Decl. ¶¶ 27-29 (explaining why "first" and "second" would be used to describe the order of different types of elements in a series combination).

The specification of the '361 patent further shows that a person of ordinary skill in the art would understand "first" and "second" to describe an ordering. With minor exceptions, the specification consistently describes the "first" dynamic element as positioned *before* the "second" static element with respect to the direction of light propagation in the claimed filter. *See* '361 patent at 3:44-47 ("The principle of operation of the wavelength filter is the angular separation and selection of wavelengths using a coarse dynamic hologram **3** to tune onto a highly wavelength dispersive, fixed hologram **2**."), 4:63-65 ("The dynamic hologram **3** modifies the light's incident angles onto the fixed hologram **2** in fine angular steps, hence tuning the switch."), 5:40-44 ("In one architecture the optical beam may be passed through the dynamic hologram, onto the fixed grating, and then back through the same, (or an identical) dynamic hologram."), 7:13-16 ("[T]he design functionality is independent of the exact positioning of the dynamic hologram between any initial collimating lens and the fixed hologram."), 7:25-31 ("The beam is passed through the SLM **3** and diffracted by the displayed binary phase hologram . . . . The diffracted orders are then further diffracted and angularly dispersed by a fixed binary phase grating **2** . . . ."). Additionally, every figure in the '361 patent that illustrates an embodiment of the claimed invention shows the dynamic element **3** positioned before the static element **2** relative to the direction of light propagation. *See* '361 patent figs. 1-3, 6.

Mears points (at 3) to a parenthetical statement in the specification that "the sequence of the dynamic hologram **3** and the fixed hologram **2** may be reversed." *Id.* at 3:47-49. Mears also points (at 3) to a portion of the specification that states that the dynamic and static elements "may also be arranged arbitrarily." *See id.* at 1:53-64. Those excerpts, however, existed in the

original patent application *before* original claim 1 was amended to add the words "first" and "second." *See* Int'l Application Pub. No. WO 96/10762 at MEARS000007, 10-11 (Ex. D-1). Embodiments where the static element comes before the dynamic element are therefore unclaimed embodiments. *See*, *e.g.*, *TIP Sys.*, 529 F.3d at 1373 ("Our precedent is replete with examples of subject matter that is included in the specification, but not claimed."). The specification excerpts cited by Mears thus do not rebut the evidence supporting Verizon's proposed construction of "first" and "second."

Mears cites *Altiris, Inc. v. Symantec Corp.*, 318 F.3d 1363 (Fed. Cir. 2003) as supporting its position that "first" and "second" do not refer to an order. *Altiris*, however, involved a method claim that did not have ordinal adjectives such as "first" and "second" to describe the order of the method steps. This case involves apparatus claims that do use such adjectives. *Altiris* is therefore inapposite. *Compare, e.g.*, *Interactive Gift Express, Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1342 (Fed. Cir. 2001) ("Unless the steps of a method actually recite an order, the steps are not ordinarily construed to require one.") *with LifeNet, Inc. v. Musculoskeletal Transplant Found.*, No. 3:06CV387, 2007 WL 1815629, at *7-8 (E.D. Va. June 21, 2007) (terms "first," "second," and "third" in a method claim "mean that the steps recited in the claims must be completed in order").

Finally, Verizon's expert Dr. Stephen Ralph has provided a declaration explaining how a person of ordinary skill in the art would interpret the claimed "series combination" of a dynamic and a static wavelength dispersive element. Ralph Decl. at ¶¶ 25-29. Dr. Ralph confirms that a person of ordinary skill in the art would interpret "first" and "second" to connote an ordering of the dynamic and static elements recited by claim 1.

The intrinsic and extrinsic evidence thus shows that "first" and "second" describe an ordering of the corresponding elements. Verizon's proposed construction makes that order clear and should be adopted; Mears's contrary construction should be rejected.

IV. CONCLUSION

For the reasons described above, Verizon respectfully requests that the Court adopt Verizon's proposed constructions of the disputed claim terms.

Dated: July 6, 2015

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that all counsel of record who are deemed to have consented to electronic service are being served with a copy of this document via the Court's CM/ECF system per Local Rule CV-5(a)(3) on July 6, 2015.

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